

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A probe for detection and quantification of a lipid second messenger, which comprises:

a polypeptide which can specifically ~~bound to~~ bind the lipid second messenger, two chromophores respectively having different fluorescence wavelengths, wherein each of the chromophores is linked to each end of the polypeptide through a rigid linker sequence; and a membrane localization sequence linked to one of the chromophores through a rigid linker sequence.

2. (Currently amended) The probe for detection and quantification of a lipid second messenger of claim 1, wherein the polypeptide which can specifically ~~bound to~~ bind the lipid second messenger is a lipid second messenger-binding protein.

3. (Original) The probe for detection and quantification of a lipid second messenger of claim 2, wherein the lipid second messenger-binding protein is a pleckstrin homology domain from GRP1.

4. (Previously presented) The probe for detection and quantification of a lipid second messenger of claim 1, wherein the chromophores are a cyan fluorescent protein linked to N-terminal end of the polypeptide and a yellow fluorescent protein linked to C-terminal end of the polypeptide.

5. (Previously presented) The probe for detection and quantification of a lipid second messenger of claim 1, wherein the linker sequence is a rigid α -helix linker consisting of repeated sequences of SEQ ID NO: 1.

6. **(Previously presented)** The probe for detection and quantification of a lipid second messenger of claim 1, wherein at least one linker sequence has a single di-glycine motif.

7. **(Previously presented)** The probe for detection and quantification of a lipid second messenger of claim 1, wherein the membrane localization sequence is a lipidized sequence or a transmembrane sequence.

8. **(Previously presented)** A method for detecting and quantifying a lipid second messenger, which comprises:

co-existing the probe for detection and quantification of a lipid second messenger of claim 1 with the lipid second messenger; and

measuring changes in fluorescence spectra.

9. **(Previously presented)** The method for detecting and quantifying a lipid second messenger according to claim 8, which comprises:

introducing a polynucleotide to express the probe for detection and quantification of a lipid second messenger into cells; and

co-existing the probe with the lipid second messenger.

10. **(Previously presented)** The method for detecting and quantifying a lipid second messenger according to claim 8, which comprises:

introducing a polynucleotide to express the probe for detection and quantification of a lipid second messenger into a non-human totipotent cell; and

ontogenizing the cell to non-human animal, thereby co-existing the probe with the lipid second messenger in all cells of the animal or offspring animal.

11. (Previously presented) The method for detecting and quantifying a lipid second messenger according to claim 9, wherein the probe for detection and quantification of a lipid second messenger is fixed on membrane in the cells, and the lipid second messenger produced in the membrane is detected and quantified.

12. (Previously presented) A non-human animal or offspring animal thereof, which is obtained by:

introducing a polynucleotide to express the probe for detection and quantification of a lipid second messenger of claim 1 into a non-human totipotent cell; and
ontogenizing the cell to the non-human animal.

13. (Original) A method for screening a substance for quantifying a lipid second messenger, in the cells of the non-human animal or offspring animal thereof of claim 12, which comprise introducing a test sample into the non-human animal or the offspring animal thereof.

14. (Previously presented) The method for detecting and quantifying a lipid second messenger according to claim 10, wherein the probe for detection and quantification of a lipid second messenger is fixed on membrane in the cells, and the lipid second messenger produced in the membrane is detected and quantified.